India, and appears to have been a great success. At the present time, what is under consideration is the form of reorganisation which would be best; but it would appear that it is possible that economic research departments may be recognised under a director-general of chemistry with deputy directors for various special branches of economic science, and that all chemists in Government employ should be included in the service, the reorganisation being intended, of course, to increase the output of work and to prevent overlapping. Thus, if there were a director-general of chemistry in India, the deputy directors working under him would include a deputy director for agriculture and a deputy director for forest products, while the provincial agricultural and forest men of science would work in co-ordination with their brethren in other provinces under instruction from, and in general consultation with, their particular deputy director. Apparently, there would also have to be separate directors, say, for organic chemistry and also in charge of mineral chemistry, etc. If this were carried out properly India might make extremely rapid progress in industry and commerce, and in such a way that its future may be revolutionised.

NOTES.

FROM a White Paper published on July 10 we learn that among the Supplementary Estimates for the year ending March 31, 1919, is the sum of 1,000,000*l.* which is to be devoted through the Board of Trade to the purpose of assisting the dye-making industry. This is the first instalment of a total sum of 2,000,000*l.* to be provided in the shape of loans and grants to be spread over three years, and divided as follows:—1,250,000*l.* in loans at not less than 1 per cent. above the Bank rate, with a minimum of 5 per cent., repayable in twenty years or earlier if the profits of the manufacturer are more than 9 per cent.; 600,000*l.* in aid of extensions of plant and buildings; and 150,000*l.* in grants in aid of research. It will be remembered that early in 1915 a grant of 1,000,000*l.* was made to one firm at Huddersfield, out of which was created the company known as British Dyes, Ltd. This, not unnaturally, created a feeling of dissatisfaction on the part of those dye-making firms which received nothing. The sum mentioned is to be distributed among these firms, besides the substantial amount allocated to the purposes of research. Presumably the 100,000*l.* given for this purpose in 1915 has been spent, but it would be interesting to know how and by whom the money has been used and with what results, in view of the fact that the central research laboratory originally contemplated has never been erected, nor the Technical Committee announced in July, 1915, called into existence.

WE publish this week an article dealing with recent advances in scientific plant-breeding, in which the remarkable progress made in recent years, especially in India, is described. As a pendant to this article we may invite attention to the announcement made in Parliament by the President of the Board of Agriculture on July 18 that active steps have been taken with a view to the establishment at Cambridge of an Institute of Agricultural Botany, the primary function of which will be the breeding and distributing of improved varieties of agricultural crops. The scheme in question was very fully described by Mr. Lawrence Weaver, of the Board of Agriculture, at a meeting of the Agricultural Seed Association held on July 15. It appears that the new institute will be modelled on the famous Swedish plant-breeding station at Svälof, and that its activities will be to follow two distinct lines, one of which will be purely scientific, while the other will have a commercial outlook. More precisely, the scientific wing will be concerned with the producing of pure cultures of new varieties on the field-plot scale; the economic wing will deal with the growing and distribution on a large scale of these varieties. Presumably, on the Svälof model, the scientific side will oversee the operations of the commercial to the extent of guaranteeing the purity of the stocks distributed by the latter. It has been announced that subscriptions towards the establishment of the new institute amounting in the aggregate to upwards of 30,000*l.*, have already been received, including a sum of 10,000*l.* down and 2000*l.* a year for five years from the firm of Sir Robert McAlpine and Sons. It has also been announced that the Board of Agriculture will provide the necessary buildings and equipment. It is most gratifying to have this evidence of the growing appreciation by the public of the value of scientific work in economic directions. The new institute may be confidently expected to have a profound influence on the future development of British agriculture.

THE question of the payment for the services of scientific men working in connection with the industrial research associations being formed on the lines suggested by the Department of Scientific and Industrial Research has been raised in the House of Commons by Sir William Beale. Though the associations could make remuneration to scientific men appointed to serve on advisory committees, or to specific posts constituted by them, they were not authorised to pay them for services as members of councils or boards of management. It has now been decided by the Board of Trade that this condition may be abrogated, and payment can be made after approval by the Department of Scientific and Industrial Research. Sir William Beale's question, asked on July 18, and Sir Albert Stanley's answer, are as follows:—*Sir William Beale:* To ask the President of the Board of Trade whether he is aware of the conditions under which scientific men are asked to serve on the councils or boards of management of industrial research associations formed under the direction or with the approval of the Board to carry out or promote scientific and industrial research, in consequence of the rules and practice prescribed by the Board of Trade to discourage payment for such services rendered by scientific men other than reimbursement for out-of-pocket expenses; and whether the Board has taken or will take steps to enable such further reasonable remuneration to be paid as will attract to or at least make possible for such research committees as are being formed in connection with the Department of Scientific and Industrial Research the co-operation, advice, and assistance of scientific men of undoubted capacity to render valuable services whose position and means do not enable them to do so on mere compensation for out-of-pocket expenses. *Sir Albert Stanley:* In dealing with applications for licences under the provisions of section 20 of the Companies Consolidation Act, 1908, due provision is made for the payment of reasonable remuneration to members of the council of management of such industrial research associations with the approval of the Department of Scientific and Industrial Research.

THERE is a strongly expressed opinion among those engaged in the fisheries industries that the time has now come for the establishment of a separate Ministry or Board of Fisheries. The National Sea Fisheries' Protection Association carried a motion, at its annual meeting at Fishmongers' Hall last week, pressing for such reconstruction and appointing a deputation to wait upon the President of the Board of Agriculture and Fisheries. In other quarters the same attitude is now being generally taken up. The needs of the immediate future—that is, unification of control, better local administration, scientific research in relation to fish as food, the better training and education of boys passing into the deep-sea fishing industry, and increased facility of distribution—do not seem likely to be satisfactorily dealt with under the present system of local and imperfect central control. The question of reconstruction of the present depleted fishing marine is also regarded as one of great importance, and it is felt that postponement of this until after the war may be prejudicial to the future of the industry, and that it can be adequately considered only by a strongly organised Department of Fisheries.

THE establishment of a Ministry of Health has attracted considerable public attention, and a widely signed national memorial in support of this has been forwarded to the Prime Minister by Sir Kingsley Wood. In the House of Lords on July 17 Lord Willoughby de Broke directed attention to the desirability of establishing a Ministry of Health without undue delay, and moved a resolution to that effect, which was carried. He pointed out that we are faced with the lowest birth-rate on record, and that the Registrar-General had estimated that but for the war there probably would have been 650,000 more babies born in England and Wales since 1914 than there had been. The motion was supported by Viscount Haldane, who said that far the greatest loss of population was ante-natal rather than post-natal, and urged that the matter required careful scientific investigation. There ought to be an authority like the Board of Education working through borough and county councils, the effect of which would be that the Local Government Board would become what it primarily ought to be—a ministry of public health, and only secondarily a ministry of local government. Viscount Peel, who replied sympathetically on behalf of the Government, said that there was no suggestion that the Maternity Bill was to be substituted for a measure co-ordinating all the powers of the central authorities. There were considerable difficulties to be overcome, and the matter could not be dealt with in a Bill of a few clauses. To attempt to separate the administration of local government from health questions would be deplorable, and there would be great difficulty in separating the health functions of the administration of the Poor Law from functions connected with public assistance.

THE death is announced, on July 18, of Dr. F. Hodson, for several years science master at Bedales School, Petersfield, and the author of "Broad Lines in Science Teaching."

WE regret to note that the death of Mr. John Frederick Robinson is announced in *Engineering* for July 19. Mr. Robinson was born in May, 1853, and was a director of the North British Locomotive Co., Ltd. He was educated at Owens College, Manchester, and served an apprenticeship with Messrs. Sharp, Stewart, and Co., Ltd. He was a member of the Institution of Civil Engineers, and served on the council of the Institution of Mechanical Engineers during the period 1902–9.

DR. W. J. M. ETTLES, whose death on July 19, at fifty years of age, as the result of an operation, we record with much regret, was distinguished not only by his work as a consulting oculist and ophthalmic surgeon, but also by his knowledge of the principles of physical optics, as evidenced by the fact that he had been president of the Optical Society, as well as of the Hunterian Society. Dr. Ettles qualified as M.B., C.M., at Aberdeen in 1890, and after a few years' practice in London he returned and graduated with highest honours as M.D. in 1896. He gave the Hunterian oration in 1908 upon the subject of "The Renaissance of Ophthalmology during the Hunterian Era," and he contributed to the Transactions of the Optical Convention in 1905 a paper on "Optical Principles of the Ophthalmometer, with Descriptions of New Instruments." Dr. Ettles was particularly interested in colour-vision tests, and played an important part in the "Trattles" case of about ten years ago, which led to a revision of the methods adopted by the Board of Trade in examining in colour-vision candidates for certificates as master or mate in the mercantile marine. His death while in the prime of life will be deplored by many friends, as well as by numerous patients who have had the advantage of his professional knowledge and skill.

ATTENTION having been directed in Kentish papers to the desirability of establishing the new marine grass, *Spartina townsendii*, in the extensive mud-banks of the Medway between Chatham and Sheerness, the owner of some "saltings" has decided to act on the suggestion, and, having through Mr. W. H. Shrubsole secured the co-operation of South Coast naturalists, arrangements are now in progress for collecting and transferring plants to the Medway. On the Essex coast there are large marshy areas suitable for the growth of Spartina; and if it were planted there and in similar districts around our shores it is highly probable that before many years our supply of home-grown material for paper-making would be considerably increased.

AT the invitation of the council of the Institution of Electrical Engineers, a conference of representatives of the Associated Municipal Electrical Engineers of Greater London, the Chief Technical Assistants' Association, and the Electrical Power Engineers' Association was held at the temporary offices of the institution on July 9. The chair was taken by Mr. C. H. Wordingham, C.B.E., president of the institution. At the close of the proceedings it was resolved that one single combined protective association be formed for the whole electric supply industry. Chief engineers will be included in the membership provided they are not employers or employers' representatives on an industrial council or similar body dealing with technical staffs. The qualifications for membership of the association will be those of the Electrical Power Engineers' Association, but all new members elected after December 31, 1921, shall be required to have passed the A.M.I.E.E. examination or an equivalent examination.

DR. R. R. MARETT, who has held the office of president of the Folklore Society for the unusually long period of five years, devoted his final presidential address to a discussion of the transvaluation of culture. He protested against the description of the science of folklore as the study of survivals. It would be better, he believes, to reject the fossil metaphor altogether. Inasmuch as survivals survive, they are not quite dead after all, but in some humble and surreptitious way of their own help to constitute and condition the living present, whether it be for worse or better. It is of chief importance to inquire what survival is as a process, and how this particular process is related to the other processes that go with it to make up the general movement of history. In short, a dynamic study of the facts relating to survival keeps in touch with reality as manifested in the life-force.

In the *South African Journal of Science* (vol. xiv., No. 4) for November, 1917, Prof. J. W. Bews discusses the plant-succession in the thorn veld. The acacias, especially *Acacia horrida* and *A. arabica*, are the pioneers, as they are able to establish themselves with no shade, shelter, or protection against grass-fires. After they are established many other species, germinating in the seed-bed prepared for them by the activity of earthworms, termites, and ants beneath the thorn-tree, grow up in the shade. Various stages have been traced, and ultimately the subsequent species may kill the pioneer. As a rule, however, the thorn-trees remain dominant in what is, at present, over the largest areas, the final stage. Seed-dispersal is little due to wind, the chief agents being birds, but for species with capsular fruits and small seeds, ants, which are very abundant, play an important part. Termites also exert important influence on the plant-succession.

The various forms of "scab" found on potato-tubers have for long been more or less puzzling to plant pathologists. The investigations of recent years have considerably enlarged our knowledge of parasitic organisms such as *Synchytrium endobioticum, Spongospora subterranea, Actinomyces chromogenus*, etc., and of their effects upon the tuber. Workers in this domain of research will be interested, therefore, in a paper published in the *Journal of Agricultural Research* for May 27 by Mr. J. J. Taubenhaus, who describes a form of scab of the sweet potato which he calls "Pox," and which also occurs on the ordinary potato (*Solanum tuberosum*). According to this author, the causative parasite in this case is a myxomycete named *Cystospora batata*, Ell., which probably hibernates as cysts in the soil. It would be interesting to know whether this organism occurs in the Old World as well as in the New, and doubtless the publication of the paper referred to will stimulate search for it.

The damage to tomatoes and other valuable glass-house crops due to the root-nematode or eelworm (*Heterodera radicicola*) is widespread and considerable, and, so far, no economical and effective measures of control have been devised. Some experimental work on this subject is described in an article by Mr. Willis P. Durz in *Soil Science* (vol. iv., No. 6), in which the application of sodium cyanide to infested greenhouse soil was tested, and under certain conditions gave satisfactory results. The cyanide dissolved in water was applied in the proportion of 200 lb. per acre, one-third gallon per square foot of soil, as weaker solutions were found to be ineffectual; one week after the first treatment a second similar treatment was given. In order to bring out the larvæ from their cysts the soil was kept moist and warm for about five days before each application. All plants should be removed from the soil before applications of sodium cyanide at this rate, and the soil should be aerated and leached to remove any traces of cyanide gas before replanting Other methods of control recommended are the application to the soil of formaldehyde and of sphagnum-moss extract and the raising of the temperature of greenhouses to 101° F.

The latest addition to Messrs. E. Stanford's series of war-maps is a map of Denmark, Schleswig-Holstein, etc., published at the price of half a crown. The scale is approximately 1 : 1,140,000. No relief is shown, but water under ten fathoms is coloured lighter blue than water of greater depth. International boundaries on land are shown in red. It would have been useful to mark the boundary of the Danish Archipelago towards Sweden and Germany by a dotted line. The map has plenty of names, and railways are clearly marked. The courses of the British and German fleets at the Battle of Jutland are shown in red.

We have received from the Commonwealth Meteorologist a copy of the rain-map of Australia for 1917. Besides the chief map showing the details of the annual rainfall, the sheet has smaller maps giving the rainfall for each month during the year. The small maps are clear, but the principal one is very obscure in places. Previous editions had not this defect, and it is to be hoped that it represents merely a passing phase of difficulty in printing. The abnormal conditions of rainfall were even more pronounced in 1917 than in 1916, and 75 per cent. of the area of the country had a rainfall above the average. Some parts of Western Australia had the wettest year on record. Throughout the wheat belt rains in general were much above the normal, especially during August, September, and October. In parts of Victoria, New South Wales, and Western Australia too much rain injured the wheat harvest, the returns of which were considerably below the average. The unusual conditions are attributed by Mr. H. A. Hunt partly to the strong monsoonal influences in summer and partly to the exceptional development of southern low pressure in winter. Very similar conditions prevailed in 1916.

In the Journal of the Royal Society of Arts (No. 3417, May 17) Mr. Alfred Dickinson discusses "Water-power in India." As an example he quotes the dam across a valley in the Western Ghats constructed by Messrs. Tata, Sons, and Co., which provides 300,000 h.p. continuously. Mr. Dickinson is now investigating the possibility of utilising the irrigation lake at Perigar, in the Madras Presidency, for power purposes, and numerous other schemes of the same kind are possible. With its enormous supply of minerals for metallurgical development, materials like cotton, flax, and jute, and abundant and cheap labour, a great commercial and industrial development may be expected. "Although much has been done, her industrial possibilities, to use a vulgarism, have scarcely been 'scratched.'"

The Engineering Experiment Station of the University of Illinois has published Circular No. 6, March, 1918, by Prof. H. H. Stock, upon the storage of bituminous coal. This subject has attracted considerable attention within the last few months on both sides of the Atlantic, papers having appeared on the subject in the publications of the Canadian Department of Mines and in the Transactions of two English engineering societies, whilst the theory of the spontaneous combustion of coal, which forms, or should form, the basis upon which all methods of coal storage are based, has been worked out at the Doncaster Coalowners' Laboratory. The present circular practically disregards the theoretical side of the subject, but concerns itself more particularly with the engineering features of coal storage. The various methods of storing coal are described in much detail, and, amongst others, the method of storing under water is fully considered. The various precautions in the way of thorough ventilation of the pile, restricting its height and subdividing it suitably, as well as the proper grading of coal intended to be stored, are all discussed, and stress is laid upon the importance of regular inspection and determination of the temperature of the pile; the author holds that when the temperature reaches 150° F. the pile needs to be carefully watched, and if it rises to 175° or 180° F. the coal should be removed as promptly as possible.

To which country is the advance of seismology chiefly indebted? M. de Montessus de Ballore endeavours to answer this question in an interesting paper published in the last *Bollettino* of the Italian Seismological Society (vol. xx., 1916, pp. 263–72). His estimate is based on a bibliography of seismological memoirs now being published by the Sociedad chilena de historia y geografia. This bibliography contains the titles of about 9000 articles, of which 2002 are written in Italian, 1768 in French, and 1185 in German. Great Britain is credited with 911 articles, the United States with 636, and Japan with 352. The number of papers per million inhabitants since the year 1840 is 40 in Italy, 30½ in France, 12½ in Germany and Austria, and 10½ in Great Britain. These figures take no account of the value of the individual works. Omitting purely descriptive papers, the author estimates that of papers of a general nature 12·9 per cent. are contributed by French writers, 10·6 per cent. by German, 10·2 per cent. by English, and 7·7 per cent. by Italian writers. A more satisfactory conception of the relative value of national contributions would perhaps be furnished by the number of references in some standard treatise on seismology. Taking, for instance, M. de Montessus de Ballore's "La Science Séismologique," and including only those authors quoted more than five times, we find that there are 103 references to English writers, 65 to Italian, 61 to German and Austrian, 49 to Japanese, 35 to French, and 21 to American (United States).

A notice in *Metall und Erz* for May 8 states that the important Bavarian establishments for the production of nitric acid from the air are to undergo considerable extension, in which some 200,000 h.p. of water-power will be used. A strong syndicate of bankers and others has been formed to carry out the scheme, which will involve a capital of 150 million marks.

Following upon the establishment of the Kaiser Wilhelm Institute for Research on Iron and Iron-ores comes the news from the German daily Press of some preliminary steps that have been taken to found a similar institution for researches on all other generally useful metals. A committee composed of eminent engineers and university professors has been formed to consider the establishment of a metal research institute for the benefit of the German metallurgical industry.

New sources of mineral wealth are to be found in European Turkey. According to *Metall und Erz* for May 8 last, copper-ore exists in great quantities in Turkish Rhodope, in the neighbourhood of Yardimli. In the Turkish Balkans ores of nearly all the metals occur, while gold occurs in Markova Reka, south of Uskub. In the neighbourhood of Kratova gold and galena containing a fairly high percentage of gold have been discovered. Chromium-ore in abundance has been found near Niausta, on the Salonika-Monastir railway. The mountain range of southern Macedonia is especially rich in chromium-ore, and there are iron, antimony, and lead ores.

In the *Schweizerische Elektrotechnische Zeitschrift* for January 5 last is given a summary of the results obtained from tests of various lamps with orthochromatic plates and silver-eosin plates prepared by two German firms. The tables show wattage and candle-power of various lamps and their actinic values, absolute and per watt and per Hefner candle-power for both kinds of plates with and without yellow filters. The lamps tested in this way were the Hefner lamp, vacuum and gas-filled tungsten-wire lamps, arc lamps with solid carbons and yellow and white flame-carbons, enclosed arcs, and quartz-enclosed mercury arcs.

We note in the *Chemical News* of June 21 an account of the preparation and properties of fibres made from fused steatite or soapstone (a magnesium silicate), which resemble fused quartz in their elastic properties. It was desired to obtain threads of 0·1 to 0·2 mm. in diameter and a metre long; such threads are somewhat difficult to prepare from fused quartz on account of the presence of air-bubbles. The material in question was found by Prof. Guthe (Bureau of Standards, Washington, Bulletin i., No. 1) to answer admirably; it had all the characteristic properties of fused quartz with the additional advantage that thick fibres do not break so readily. In the oxyhydrogen flame the substance fuses to a clear glass, and can be formed into threads of the requisite dimensions. The elastic fatigue of such fibres is very small—about one-third that of steel or phosphor-bronze. The linear coefficient of expansion was found to be −0·0000045.

An article on coal-saving by the scientific control of steam-boiler plants appears in *Engineering* for July 12. The author, Mr. D. Brownlie, gives average figures for 250 typical steam-boiler plants, covering the period from 1910 to the present time. It is estimated that 58,500,000 tons of coal per annum are used in this country for steam-raising purposes (in normal times), exclusive of 15,000,000 tons used in railways. The 250 plants had a total of 1000 boilers, principally of the Lancashire type. With hand-firing the average net working efficiency is 57·8 per cent., as against mechanical firing with an average net working efficiency of 61·4 per cent. Both varieties receive very little scientific attention and supervision; efficiencies from 75 to 82½ per cent. can be maintained with both types. The author's experience is that in normal times the average firm could save 7 to 10 per cent. in the fuel bill alone by buying on scientific lines. The author estimates that there are 45,000 to 60,000 steam boilers at work in Great Britain, calculated in terms of average-sized Lancashire boilers, and considers that all the steam produced in the country to-day could be obtained much more economically with 25 per cent. fewer boilers.

Messrs. *Crosby Lockwood and Son* announce "Plane Surveying," by Prof. J. K. Finch, and "How to Become a Wireless Operator: A Practical Presentation of the Theory of Electrical Waves, their Propagation, and their Adaptation to Wireless Communication," by C. B. Hayward. Messrs. *Longmans and Co.* have in preparation a new edition—the second—of Sir R. A. S. Redmayne's "The Ventilation of Mines," containing additional notes relating to the Coal Mines Act of 1911. The fifth volume of the same author's "Modern Practice in Mining" is also in preparation. *Sir Isaac Pitman and Sons, Ltd.*, will issue shortly "A Small Book on Electric Motors for Continuous and Alternating Currents," by the late W. Perren Maycock.

Messrs. J. Wheldon and Co., 38 Great Queen Street, W.C.2, have just issued, at the price of 2*d*., a very full and well-arranged Botanical Catalogue (new series, No. 83), which should be of interest and value to many of our readers. It is conveniently divided into eight sections, dealing respectively with general botany, geographical botany, and the floras of Britain, Europe, Asia, Africa, America, and Australasia. Many first and rare editions are included;

also sets of botanical serials. Among the latter we notice Curtis's *Botanical Magazine* from 1787 to 1906; Edwards's *Botanical Register*, a complete set; Maund's "Botanic Garden," large-paper edition; the Transactions of the Linnean Society of London, complete to 1916; the *Orchid Album*; the *Orchid Review*; the *Phytologist*, by Luxford, Newman, and Irvine, all published. Messrs. Wheldon also have for disposal a large-paper copy of Loddige's "Botanical Cabinet," complete in 20 vols.

OUR ASTRONOMICAL COLUMN.

PERIODIC COMETS.—Wolf's comet was detected by Prof. Barnard at Yerkes Observatory on July 12, three days later than M. Jonckheere's first observation. M. Kamensky's predicted date of perihelion, 1918 December 13·3899, appears to be too early by 0·0531d., which is not a large error, and the ephemeris given in NATURE for July 11 will suffice for finding the comet.

Borrelly's periodic comet will pass perihelion a month earlier than Wolf's, and the conditions will be favourable for observation. Mr. L. v. Tolnay gives the following ephemeris in *Ast. Nach.*, No. 4948; it is for Greenwich midnight:—

		R.A.			S. Decl.		Log *r*	Log Δ
		h.	m.	s.	°	′		
July	29	3	19	0	17	1	0·2653	0·2107
Aug.	2	3	28	5	16	41	0·2591	0·1972
	6	3	37	10	16	21	0·2529	0·1835
	10	3	46	15	16	1	0·2467	0·1696
	14	3	55	18	15	41	0·2405	0·1554
	18	4	4	19	15	20	0·2343	0·1411
	22	4	13	17	14	59	0·2282	0·1265
	26	4	22	12	14	37	0·2222	0·1116
	30	4	31	4	14	13	0·2162	0·0964

The perihelion passage is about November 16·65, log $a=0·5598$, $e=0·6153$, log $q=0·1450$.

THE PERIOD OF SIRIUS.—The companion to Sirius has lately been more easily observable than during the previous forty years, and has completed rather more than a revolution since its discovery in 1862. Mr. R. Jonckheere has obtained measures with the 28-in. refractor at Greenwich in the course of the last four winters, and has taken the opportunity of making a revised estimate of the period (Monthly Notices, R.A.S., vol. lxxviii., p. 480). The mean result is 50·02 years, which is 1·78 years shorter than that given by Burnham. The shortest period ever given was that of 48·84 years, arrived at by Zwiers, and the longest that of 58·47 years given by Gore. Mr. Jonckheere recalls that nearly eleven years before the visual discovery Peters made an investigation of the orbit from transit observations, and although the maximum displacement was only 0·152s., he obtained the closely accurate period of 50·01 years. Adopting the parallax 0·38″ and a semi-major axis of 7·5″, the corrected mass of the system is 3·07 times the mass of the sun.

TWO SPECTROSCOPIC BINARIES OF LONG PERIOD.—The spectroscopic binary 32 θ_2 Cygni has been under observation at the Dominion Observatory, Ottawa, by Mr. J. B. Cannon since 1914, and a preliminary orbit has now been determined (*Astrophys. Journ.*, vol. xlvii., p. 193). The period of this star is more than three years, and the eccentricity of the orbit 0·182, but there are irregularities which suggest the presence of a third body The velocity-curve may be explained by considering the system as consisting of a luminous star revolving about another body in a circular orbit in 390 days, and the pair revolving in an elliptic orbit about a third body in 1170 days. The star is of spectral type G5 and magnitude 5·15.

A spectroscopic binary of still longer period has been under investigation at the Cape Observatory by Dr. J. Lunt since 1903. The star in question is α Phœnicis, and the period has been found to be 10·62 years, or 3880 days. The eccentricity of the orbit is 0·32, and the system is receding with a velocity of 75·76 km. As regards length of period, the star is second only to Polaris, which has a period of 11·9 years. The star is of magnitude 2·44 and of type K.

STONYHURST COLLEGE OBSERVATORY.—The annual report of this observatory for 1917 includes a valuable record of the state of the sun's surface on 210 days of observation. In units of one five-thousandth of the visible surface the mean disc-area of the spots was 12·1, which is about three times greater than that of the previous year, and twice as great as at the previous maximum. The increased activity commenced early in February and reached its greatest intensity in August, the greatest area on any one day being 50 units on August 11. The February and August groups were of exceptional size, and second to none that have appeared during the last thirty-eight years. As regards the ranges of magnetic declination and horizontal force, the year was relatively quiet and out of accord with the solar activity. A comparison of the Stonyhurst drawings with spectroheliograms taken at the Yerkes Observatory has shown an almost perfect agreement between the faculæ and the calcium flocculi, but no similarity with the hydrogen flocculi. The report also includes particulars of meteorological and magnetical observations.

THE FUTURE OF THE ELECTRICAL TRADES.

THE Departmental Committee appointed by the Board of Trade to consider the position of the electrical trades after the war, with special reference to international competition, has now issued a Report (Cd. 9072, price 2*d.*). Like other similar Committees, this urges that "remedial and unifying legislation governing the supply and distribution of electrical energy should be introduced forthwith." A historical *résumé* of electrical enterprise in this country is given, and it is pointed out that, like the automobile industry, it has been hampered all through by the lack of a scientific outlook on the part of the officials of our Government Departments. Acting according to their lights, they encouraged competing companies using different types of plant and different systems to set up in the same area, the reason given being that the healthy competition would cheapen the supply to the consumer. The mischievous effect of this policy is well illustrated by the circular issued by the Board of Trade in 1916 calling on the supply companies to link up with one another in the national interests so as to reduce the consumption of coal and economise labour. That is, after making it practically impossible for the companies to link up, the Board calls on them to do so.

Looking to the future, the Committee points out that as the supply of electrical energy is a "key industry," it is imperative that questions concerning it should be prevented from becoming party questions. They should be considered solely on their merits from the point of view of national requirements. We quite agree, but we are afraid that this is a counsel of perfection. Few questions are of greater urgency than that of standardising some system for electrifying